Rover Environmental Monitoring Station (REMS)
LOCAL METEOROLOGICAL AND ENVIRONMENTAL STUDIES

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Instrument Measurements and Summary

Initial Description for MSL Acquisition Website

June 30th, 2004

- **The Centro de Astrobiología (CAB) is leading the design of an instrument made up of a suite of sensors for measuring the environmental conditions around the 2009 MSL rover.**
- **Six parameters will be measured:**
  - Air temperature
  - Pressure
  - Wind speed and direction
  - Humidity
  - UV radiation

CAB is establishing the science and instrument development groups.

- The instrument science team is not yet fully defined but CAB is in contact with different experts in this field within Spain and in the USA and Europe.
- An international development team for instrument hardware is being formed with participants from:
  - Finland and Spain to provide sensors, and
  - a Spanish space-qualified company to carry out all integration activities.

Note: There will be an opportunity for additional US investigators to become involved in this investigation through open competition for Interdisciplinary Scientists, Facility Instrument Scientists, and Participating Scientists to be conducted by NASA . (see FAQ 20 on MSL Acq. Web Page)

Measurement Goals:

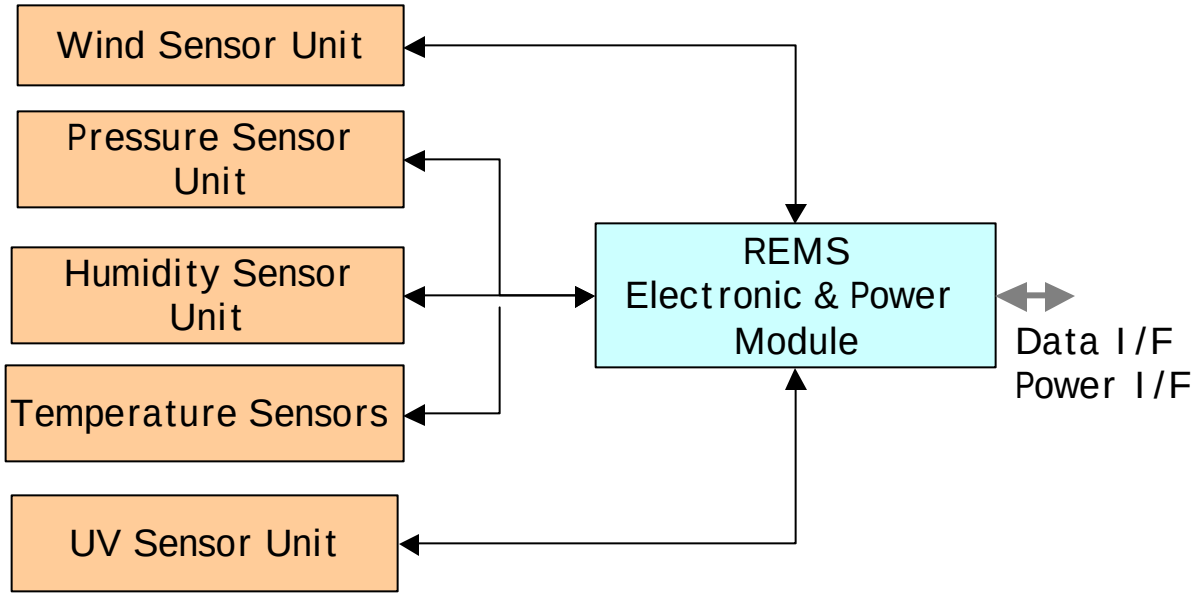
The Rover Environmental Monitoring Station (REMS) involves measurements which have impact in two specific scientific areas

- Basic Local Meteorology.
- Astrobiology: Fluctuations, intensity and spectrum of the UV flux at the surface.

Overall Science Objectives:

- Study of planetary local boundary layer
- Mesoscale meteorological modeling:
  - Validation of the models
  - High resolution meteorological data base
- UV radiation measurements to characterize the Mars atmosphere and surface UV flux.

REMS Block Diagram



DESIGN CRITERIA:

1. Minimize mass and power on sensors units.
2. No intelligence on sensor units.
3. Electronic & Power Module (EPM) main functions:
   - Command executing
   - Data acquisition
   - Storage data
   - Communication
   - Housekeeping
   - Sensor Unit power control

Measurement Summary

Measurement	Sensor	Accommodation	Range	Precision	Comment
Wind Speed	Hot Film Anemometer	Mast	0-80 m/sec	0.2 m/sec	3 axis
Atmospheric Pressure	Capacitance Sensor	Mast or Upper Rover Body	2-12 millibar	1-4 mbar	
Relative Humidity	Capacitive Thin Film Polymer	Mast or Upper Rover Body	0-100 % RH	1% minimum	
Temperature	Resistance Temp Detector	Mast and low body or Arm	140 – 350 K	0.1K	High and low mount to enable measurement of gradients
Ultraviolet	Multichannel Al-In-Ga-N photodiode	Mast or Upper Rover Body	200-400 nm in 6 channels plus total integrated dose	8 bit	

Operations Scenarios (1)

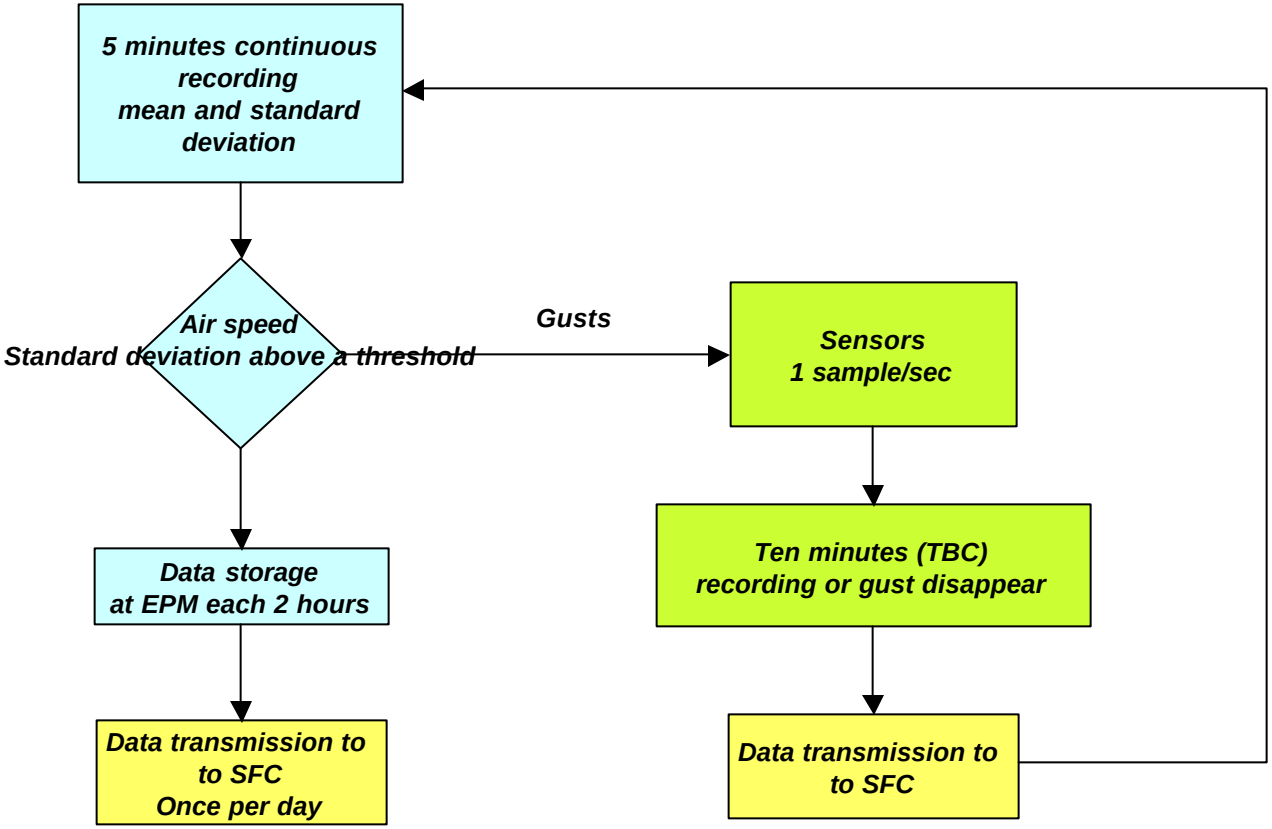
REMS operations, especially sensors related with the atmosphere, are associated with diurnal cycles and atmosphere phenomena. Four operation strategies are proposed for meteorological sensors

(All information is TBC)

Operation mode	Description	Pressure	Humidity	Temperature	Air speed	UV
Stand-by Mode	Only EPM is activated. All sensors are off					
Nominal Mode	Standard mode	1 rec. each 2 hours	1 rec. each 2 hours	1 rec. each 2 hours	1 rec.each 2 hours	1 rec. each 1 hour
Investigation Mode	Especial meteorological conditions are foreseen (short period of time hours)	1 rec. each 15 min	1 rec. each 15 min	1 rec. each 15 min	1 rec. each 15 min	1 rec. each 15 min
Event Mode	Special event are detected like a gust (very short period of time, minutes)	1 sample per sec.	1 sample per sec.	1 sample per sec.	1 sample per sec.	1 sample per sec.
Special Mode	Scientist select an instrument and a sampling rate	Special conf.	Special conf.	Special conf.	Special conf.	Special conf.

Operations Scenarios (2)

Nominal Mode recording cycle and example for shifting to Event Mode



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